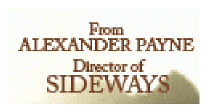
I.H.T. OP-ED CONTRIBUTOR

Celestial Storm Warnings

By JOHN P. HOLDREN and JOHN BEDDINGTON
Published: March 10, 2011



Weather is often in the headlines. But largely unnoticed last month was the weather that forced airlines flying the polar route between the United States and Asia to detour south over Alaska. This unusual routing was a response to a “space weather” event — an enormous ejection of charged gas from the Sun capable of scrambling terrestrial electronic instruments.

Such events can happen at any time but tend to become more severe and more frequent in roughly 11-year cycles. The peak of the current cycle is expected in 2011-12. What’s especially significant about this is that the world’s reliance on electronic technology — and therefore vulnerability to space weather — has increased substantially since the last peak a decade ago.

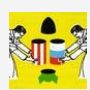
From sporadic solar flares to ethereal shimmering aurora, manifestations of severe space weather have the power to adversely affect the integrity of the world’s power grids, the accuracy and availability of GPS, the reliability of satellite-delivered telecommunications and the utility of radio and over-the-horizon radar.

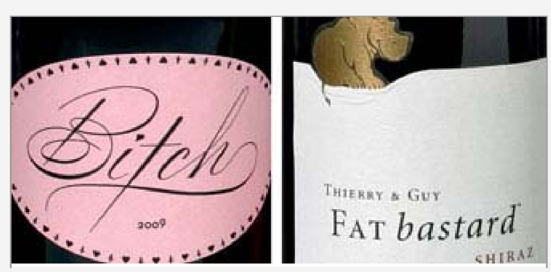
The detour of recent flights was due to the potential loss of essential air traffic control radio near the North Pole and was costly and inconvenient; some airlines had to bump passengers to take on added fuel for the re-routing.

Space weather can affect human safety and economies anywhere on our vast wired planet, and blasts of electrically-charged gas traveling from the Sun at up to five million miles an hour can strike with little warning. Their impact could be big — on the order of $2 trillion during the first year in the United States alone, with a recovery period of 4 to 10 years.

History is rife with warnings. In 1859, the British astronomer Richard Carrington observed that an apparently freak event causing compasses to go haywire, telegraph systems to fail and aurora to be visible as far south as Cuba was preceded by an intense white light flare on the surface of the Sun.

In 1921, space weather wiped out communications and generated fires in the northeastern United States. In March 1989, a geomagnetic storm caused Canada’s Hydro-Quebec power grid to collapse within 90 seconds, leaving millions of people in darkness for up to nine hours. In 2003, two intense storms traveled from the Sun to Earth in just 19 hours, causing a blackout in Sweden and affecting satellites, broadcast communications, airlines and navigation.





A study by the Metatech Corporation in 2008 showed that a repeat of the 1921 solar storm today would affect more than 130 million people with sudden and lasting ramifications across the U.S. social and technical infrastructure. Last November, a Lloyd's report stated that "A loss of power could lead to a cascade of operational failures that could leave society and the global economy severely disabled."

Thanks to the work of scientists across the globe, we now have a better understanding of the causes and frequency of these events. We know that space weather disturbances are strongly controlled by magnetic fields in the Sun's atmosphere. We know that a storm is more likely when the Sun is approaching the peak of its magnetic cycle, and we can identify where on the sun the intense activity eventually causing the storm is likely to occur.

Space scientists also indicate that the severity of future storms could be much greater than those experienced in recent decades, pointing to the critical need for careful monitoring of the Sun and its effects on the Earth.

Action to put these understandings to work to protect our societies is well underway. In January, an agreement was signed between Britain's Meteorological Office and the Space Weather Prediction Center of the U.S. National Oceanic and Atmospheric Administration for wide-ranging cooperation and data sharing in the space-weather domain.

At the annual meeting of the American Association for the Advancement of Science in Washington last month, in which both of us took part, scientists, planners and emergency managers from around the globe discussed increasing concerns about space weather and the risks it poses to international human and economic well-being and national security. All agree that for critical infrastructure to be protected, new and cost-effective mitigation strategies are vital.

And there is much that can be done to reduce risks. The possibilities include back-ups for crucial systems such as GPS, tougher protective shielding for satellites, and blocking devices to harden power grids; and replacements for aging scientific satellites are needed to provide advanced warnings.

Some of these measures can bear fruit quickly, while others will pay off over the longer-term. What is key now is to identify, test, and begin to deploy the best array of protective measures practicable, in parallel with reaching out to the public with information explaining the risks and the remedies. There is commitment on both sides of the Atlantic to doing exactly that.

John P. Holdren *is the science and technology adviser to President Barack Obama.*
John Beddington *is the chief scientific adviser to Prime Minister David Cameron.*

A version of this op-ed appeared in print on March 11, 2011, in The International Herald Tribune.

Terrifying Brain Secret
You must see this terrifying brain
secret before it's too late...
www.lumiday.com